INTRODUCTORY DISCOURSE

ON THE

RISE AND PROGRESS

OF

NATURAL HISTORY.

DELIVERED BY THE PRESIDENT, APRIL 8, 1788.

THE Study of Nature, that is an attention to the ground on which we tread, the vegetables which clothe and adorn it, and the boundleſs variety of living creatures preſenting themſelves to our notice on every ſide, muſt have been one of the firſt occupations of man in a ſtate of nature. In no country hitherto diſcovered, however barbarous and unenlightened, is the human race found ſo negligent and helpleſs as not to have inveſtigated the natural bodies around them, ſo far at leaſt as from thence to ſupply

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their neceſſary wants, and even to obtain conveniences and luxuries. In the more hoſpitable climes in which probably mankind were firſt eſtabliſhed, this taſk was the more eaſy. The calls of nature would there be readily ſatisfied; and while the ſenſes were gratified with all they were capable of enjoying, the mind, ever prone to curioſity, would be continually exerciſed and delighted in inveſtigating the creation around it. Then, as the human race multiplied, would the ſpirit of competition ariſe for the diſcovery of hitherto untaſted luxuries or unknown conveniences; and he who firſt climbed the lofty palm-tree, and while its leafy honours were waving above his head, ſcattered the golden ſhower of plenty upon his admiring companions, would deſerve and enjoy more real glory, than any deſtroyer of his fellow creatures ever enjoyed, after thoſe very boughs became proſtituted to proclaim the triumph of deſolation and war.

By degrees mankind became ſo numerous and ſo adventurous as not only to occupy all that part of the world in which they were firſt ſettled, but alſo to migrate into far diſtant countries, where ruder ſkies and leſs fruitful plains taught them new wants, and put their ingenuity to greater trials. In ſhort, by means and accidents which moſt likely will long remain a problem for philoſophers, the human race became in proceſs of time diſperſed over almoſt every part of the globe where art and labour could find them protection and ſubſiſtence. Their various acquirements, in the courſe of their long, laborious progreſs, muſt have been all founded on the knowledge and obſervation of nature; and with ſo much accuracy have they ſtudied this ſubject, ſo intereſting to them all, that even in the moſt advanced ſtate of ſociety, as well as in the loweſt, mankind are perfectly agreed upon the uſes of moſt of the neceſſaries with which nature furniſhes them; they have all alike learned preciſely to what purpoſe each is fit, and all ſupply

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the ordinary wants of life, all remove its ordinary inconveniences, much in the ſame way.

If on the preſent occaſion my principal object were to amuſe the fancy, I ſhould dwell long on this early period of the hiſtory of the human race. The firſt probable wants and inventions of mankind; their progreſs from a ſtate of nature, peace and innocence, to one more turbulent and active, but leſs natural and happy; the ſimple origin of each art and ſcience, and eſpecially the ſource of all human knowledge, in the obſervation of nature, with the different degrees of cultivation which each ſcience may be ſuppoſed to have received according to the various circumſtances in which mankind have been—all theſe things might form a very amuſing ſubject for ſpeculation: but as ſuch diſquiſitions muſt be chiefly guided by the imagination, and after all could be only conſidered in the light of a romance, I muſt not at preſent enter upon them. My review of thoſe much later periods, although ſtill far remote from us, in which the progreſs of ſcience begins to be marked, muſt be even more ſlight than the traces of its footſteps in the page of hiſtory; and we ſhall eaſily conſole ourſelves for our ignorance of what former ages have thought and known, when we find how little real advantage is to be derived from the knowledge of thoſe much nearer to us.

In a very early ſtate of ſociety the ſum of human knowledge would become too much for every individual to acquire; of courſe ſome muſt neceſſarily purſue particular arts or enquiries in preference to the reſt; and this difference is obſervable not only among individuals, but alſo between different nations and bodies of men. In infant ſtates warlike accompliſhments more than any others engage the generality of the citizens, and, becauſe moſt evidently neceſſary to the ſafety of the whole, are held in the higheſt eſteem. But when external danger is kept at a diſtance, the inter-

nal regulations of the ſtate, and the ſofter arts of peace, become more intereſting to thoſe who have talents for cultivating them. A part of the community being ſufficient to ſupply the whole with the neceſſaries of life, the occupations of the reſt becoming voluntary, are as various as the virtues and vices, taſtes, genius and abilities of mankind; and the more a people are refined and enlightened, the more various and the more diſtinctly marked are the purſuits of individuals.

The early hiſtory of ſcience informs us rather of peculiar acquirements by which certain nations diſtinguiſhed themſelves from the reſt, than of the general ſtock of knowledge then in the world. Thus we are told of the ſkill of the Egyptians in aſtronomy, to which they were peculiarly led by their manner of repoſing on open terraces under a cloudleſs ſky. But we are not to conclude that this ſcience had never been cultivated by any people before, nor that the Egyptians, and all the reſt of the world, had lived totally void of curioſity, and blind to every thing around them, till their attention was excited by the trivial circumſtance above mentioned. We learn from the Old Teſtament, which if it were merely an human work would be the moſt venerable monument in the world, that Natural Hiſtory was very early one of the ſciences in the higheſt eſtimation. Without examining what was the preciſe degree of Solomon's ſkill in this ſcience, the manner in which his botanical knowledge is mentioned in the Bible, proves that to have been in thoſe days the moſt eſteemed perhaps of all learning whatever. Yet where are the records of its progreſs? How totally is the knowledge of thoſe ages and of numberleſs others loſt to us!

As botany and aſtronomy have been among the earlieſt purſuits of mankind, ſo they have been prepoſterouſly combined together, and connections frequently imagined between certain ſtars and particular plants. This is one of thoſe inſtances, but too numerous in

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the hiſtory of the human mind, of theory, like an ignis fatuus, having led men aſtray, and made them pay dear for a little real inſtruction, by bewildering them in endleſs errors and abſurdities. And ſo hard is it to overcome prejudices, ſanctified in a manner by antiquity, that this idea of a connexion between ſtars and plants, is only juſt got rid of in the moſt enlightened parts of the world.

But to conſole ourſelves under the contemplation of ſuch humiliating inſtances of human weakneſs, let us turn our attention to the father of philoſophy, at leaſt of our philoſophy, riſing ſo ſuperior to the darkneſs in which he lived, darting his penetrating glance through all nature, and eſtabliſhing principles which a long courſe of ages of enquiry have but confirmed. With Ariſtotle begins the real hiſtory of ſcience; and how much ſoever he may have erred on particular points, the greatneſs of his conceptions and the juſtneſs of his ideas on the whole, entitle him to our high veneration, and we ſhould correct his miſtakes with awe. His labours in the inveſtigation of the animal kingdom have laid the foundation of the knowledge we now poſſeſs, and it cannot ſufficiently be regretted that we have only an imperfect account of his diſcoveries.—Theophraſtus, the worthy diſciple of Ariſtotle, has given us the firſt ſcientific views of the vegetable and mineral kingdoms. His works are indeed ſhort and imperfect ſketches, but they are by the hand of a maſter. Theſe two great men ſtand unrivalled as the only philoſophical naturaliſts of antiquity of whom we have any ſatisfactory knowledge.

Several ages afterwards came Pliny, that laborious compiler, whoſe mind, too much occupied by a variety of purſuits, could properly cultivate none. He has tranſmitted to us, as far as he was able, all that was known of Natural Hiſtory, or rather all that had been imagined, at the time in which he lived. Whether Dioſcorides

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lived before or after him, and which borrowed from the other, the learned are not agreed, nor is it of much conſequence to the reputation of either. Dioſcorides has had perhaps no great injuſtice done him by a celebrated modern writer, who ſtyles him "a great compiler of receipts." In fact his works are nothing elſe than a materia medica, in which he has enumerated all the natural bodies known at that time to have been uſed in medicine, with their imaginary virtues, but with ſo little judgment, that it were charitable to ſuppoſe he meant only to collect the opinions of others, without ever attempting to exerciſe that faculty. How he came to be called the father of botany is wonderful to me. It is leſs extraordinary that he ſhould, after the revival of learning, have had innumerable commentators, becauſe his ſhort and imperfect deſcriptions would afford ample ſcope to thoſe who imagined all human wiſdom to be contained in the obſcure works of men who had lived in the world a few ages before themſelves.

That age of commentators we muſt now conſider. I purpoſely paſs over thoſe times of darkneſs which followed the ruin of the Roman Empire, during which, if there were any ſhadow of ſcience in the world, it was among the Arabians, and they cultivated Natural Hiſtory only as a branch of medicine. Thoſe who wiſh to ſtudy this part of the hiſtory of botany, will find ample ſatisfaction in Haller's Bibliotheca Botanica, where they may alſo ſee an account of all the Greek and Roman authors who have at all touched on this branch of Natural Hiſtory; and whom I have avoided mentioning, not only that I might keep within the bounds I had preſcribed to myſelf, but becauſe the labours of thoſe writers do not appear to have contributed to the knowledge we now poſſeſs.

When learning began to raiſe its drooping head in the fifteenth century, thoſe ſciences of which moſt traces were found in the writings

writings of the ancients began firſt to be cultivated. Botany was more eſpecially attended to very early, as medicine, which, however it might have been degraded in the ages of barbariſm, could never have been totally neglected, ſtood in immediate need of its aſſiſtance. The works of the ancients, and particularly thoſe of Dioſcorides, were then ſtudied with the moſt pertinacious aſſiduity; remedies which this writer had recommended were deemed infallible, and virtues which he had attributed to any plant, indiſputable. The chief difficulty in almoſt every caſe was to find out the plant he meant; and this difficulty becoming at length ſo great as to be abſolutely inſurmountable, his commentators were loſt in mazes of their own conjectures. It was happy for the credit of Dioſcorides that this was the caſe, and that the world were ſo occupied by this kind of criticiſm, as ſeldom to have examined the truth of his aſſertions.

Of theſe commentators ſome few had great original merit in giving figures of the plants of which they treated, and thoſe figures are many of them executed with ſuch perfection as to excite our aſtoniſhment; they have rarely been excelled at any following period. The firſt of theſe is Brunfelſius, whoſe figures, although only wooden outlines, often expreſs the plant intended better than many fine modern engravings, and were evidently drawn by a firſt-rate painter. Matthiolus, the moſt celebrated of all the commentators on Dioſcorides, has likewiſe given excellent figures of all the natural ſubſtances mentioned in his book; thoſe of the two Venetian editions of this work are ſtill the admiration of botaniſts, and make thoſe editions much ſought after by collectors.

The large figures of Fuchſius are no leſs celebrated, nor with leſs reaſon; although only outlines, they repreſent the plants extremely well.

The example of theſe authors was ſoon followed by others, who

publiſhed figures of plants from their own obſervation; and ever ſince the middle of the ſixteenth century the preſs throughout Europe has teemed with ſimilar publications; certainly to the great advancement of botany, although the merit of theſe works has been very various.

For almoſt two centuries after the revival of letters in Europe the attention of naturaliſts was chiefly confined to the vegetable creation; and although ſince that time the animal and mineral kingdoms have received an eminent degree of cultivation, ſtill botany has always kept its ground. The infinitely varied beauties of the vegetable tribe have, in every country, engaged ſome ingenuous minds in the contemplation of this branch of the great family of nature, and excited them to inveſtigate the laws by which it is governed. Whether their labours have been crowned with the ſmile of princes, rewarded with worldly honours and emoluments, or only deſtined to enliven the ſcenes of rural retirement, to relieve the mind amid the buſy purſuits of active life, or add new charms to ſocial intercourſe; they have never failed to carry with them their own reward, in that ſweet and innocent pleaſure which riſes under the ſteps of the botaniſt wherever he goes, in thoſe ſublime and delightful ideas of the Author of nature to which ſuch enquiries lead, and the complacency they always excite in the mind.

The inſtitution of public botanic gardens is a memorable æra in the hiſtory of botany. The firſt of theſe was, I believe, at Padua in 1533 *, where it ſtill continues to make a tolerable figure, although now ſurpaſſed by ſeveral others, which have had more powerful protectors. The gardens of Florence, Piſa, Bologna and Leyden were ſoon after eſtabliſhed, and all ſtill exiſt. Nor muſt I

* The eſtabliſhment of a *botanic* garden at Rome about the year 1450 ſeems not ſufficiently authenticated. See Sabbati Hortus Romanus.

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forget to mention that we had at London a tolerable collection of plants in the garden of Gerard, a catalogue of which, printed in 1596, exiſts in the Britiſh Muſeum, but is elſewhere rarely to be met with. The ſucceſs of botanic gardens has pretty much kept pace with the commerce of the countries in which they were eſtabliſhed; nor is this to be wondered at. The intercourſe of the Dutch with the Eaſt Indies, and their poſſeſſion of the Cape, long gave their collections, in all the different branches of Natural Hiſtory, a decided ſuperiority over thoſe of other nations. The Engliſh have now enriched their gardens far beyond any others by the ſupplies obtained from the Eaſt and Weſt Indies, and eſpecially from America.

I find myſelf obliged to paſs over a number of naturaliſts who flouriſhed from the middle to the end of the ſixteenth century. Thoſe whoſe works are the moſt known, and have been of the moſt ſervice to the world, are Tragus, Leonardus, Fuchſius, Dodonæus and Dalechampius in Botany, Bellonius in Ornithology, and Rondeletius in Ichthyology. But there are a few great names which ought not to be ſo ſlightly mentioned; I muſt be allowed to enlarge a little on the merits of Geſner, Aldrovandus, Cluſius and Cæſalpinus.

Conrad Geſner, the greateſt naturaliſt the world had ſeen ſince Ariſtotle, was born at Zurich in 1516, and died of the plague in 1565. Notwithſtanding his conſtitution was feeble and ſickly, and his life by no means a long one, he applied himſelf to the ſtudy of nature with ſuch aſſiduity, that he not only made more new obſervations than had been made by any modern writer, but alſo firſt reſtored the ſcience he cultivated to the dignity of philoſophy, of which it had almoſt loſt ſight ſince the days of Ariſtotle and Theophraſtus. Geſner cultivated medicine with equal ſucceſs, proceeding always on the ſure ground of obſervation and experience. His health, naturally weak, is ſaid to have frequently ſuffered by the

experiments he made on himſelf. But his infirmities did not deter him from taking frequent and laborious alpine journeys, any more than his very confined circumſtances prevented his being at conſiderable, and at that time very uncommon, expences, in the advancement of his darling purſuits. He founded and ſupported a botanic garden, kept a painter and engraver in his ſervice, had a very conſiderable library, and, according to Haller, was the firſt who ever formed a muſeum of Natural Hiſtory. But his greateſt honour is his having firſt ſuggeſted the idea of a methodical arrangement of plants according to claſſes, orders and genera, from the different ſtructure of the flowers; an idea which all true botaniſts ſince his time have purſued, and to which the very exiſtence of botany as a ſcience is owing.

Aldrovandus reſembled Geſner in his indefatigable induſtry and zeal for the advancement of Natural Hiſtory. Like him he devoted his life to travelling and ſtudy, and like him eſtabliſhed a muſeum and undertook works whoſe immenſity aſtoniſhes as much as their erudition. But he did not poſſeſs the ſyſtematic genius of Geſner, nor had he the prudence along with the liberality of his great contemporary. Although he had a fortune of his own, and was aſſiſted by many of the rich and powerful of his time, he was reduced to indigence towards the end of life. He lived to the age of 80, dying in 1605. His memory has been always much honoured at Bologna. The great zoological work which he left imperfect, was finiſhed after his death, and his muſeum laid the foundation of that which at preſent is one of the ornaments of that univerſity. Many ſpecimens ſtill exiſt there marked with the venerable hand-writing of their firſt poſſeſſor.

Neither had Cluſius that genius for arrangement for which Geſner was remarkable. Botany is however very much indebted to him for the publication of a vaſt number of new plants, with excel-

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lent figures which atone for the imperfections of his deſcriptions. His amiable diſpoſition, ſays Haller, procured him a great number of friends, whoſe diſcoveries enriched his own works. He always acknowledged their favours, and gave to every body their due praiſe. A number of the plants diſcovered by Geſner were firſt publiſhed by Cluſius. This illuſtrious botaniſt died in 1609, at the great age of 84. He was profeſſor of botany at Leyden, where a palm tree (a cauleſcent variety of Chamærops humilis) planted by him, ſtill exiſts in great perfection.

I am now to ſpeak of Cæſalpinus; but if I ſhould enter into a full diſcuſſion of his character and merits, it would lead me a great deal too far. His ardent attachment to Ariſtotle led him into the depths of metaphyſics, and into many errors relating to the nature of man, and the firſt cauſe of all things, which the dogmas of the court of Rome where he lived were not likely to correct, in a philoſophical mind like his. He has left evident proofs of his knowing the circulation of the blood at leaſt through the lungs, and the ſervices he has rendered to botany entitle him to be ranked among its moſt able promoters. I need not enter into the particulars of his method, which is chiefly founded on the fruit. He has made ſome miſtakes, which Haller has taken care to point out; but it muſt not be forgotten that Cæſalpinus has thrown more light on the ſtructure and affinities of vegetables than any one before his time, and has diſtinctly mentioned the ſexes of plants. He died in 1603.

While theſe great men were flouriſhing on the continent, botany began to be attended to in our own country. Turner publiſhed his Herbal in 1551; ſoon after Lyte gave a tranſlation of Dodonæus; and in 1597 was printed the firſt edition of Gerard's Herbal. It is ſufficient that I mention the names of theſe authors. Lobel, who began to publiſh in London in 1570, and who is the author of many

good obſervations, has been often miſtaken for an Engliſhman; but although he ſpent the greater part of his life here, he was born in Flanders.

It would be unpardonable if I were to finiſh this period of the hiſtory of our ſcience without mentioning Fabius Columna, who firſt gave copper plates of plants; and thoſe of an almoſt unrivalled degree of accuracy, drawn and engraved by his own hand. In his Phytobaſanos, publiſhed at Naples in 1592, and again at Florence in 1744, he has taken infinite pains, and ſhown great ſagacity, in determining ſome plants of the ancients, and has detected innumerable errors in Pliny and other authors. His Ecphraſis publiſhed ſeveral years afterwards is a larger work, and contains a large number of new plants, diſtinguiſhed and figured with the greateſt accuracy. He is likewiſe the author of a curious and learned work on the Purpura of the ancients. All theſe books, eſpecially the firſt, are very rare. Columna, an able critic himſelf, was criticiſed in his turn by one far inferior, Aldinus in his Hortus Farneſianus, printed at Rome 1625; a work in which however there are ſome good figures of rare plants, and which is not commonly to be met with.

The inſtitution of the academy of the Lyncæi at Rome in 1603 deſerves to be remarked, as that ſociety was the firſt of the kind, and has been in ſome meaſure the model of all the preſent literary ſocieties in Europe. Its chief promoter and perpetual preſident was Frederick Caeſius, a young Roman nobleman of great ſcience. Among the names of thoſe who compoſed it we find Fabius Columna and the great Galileo, a circumſtance perhaps more likely to immortalize its memory than the medals which were ſtruck upon its eſtabliſhment. This inſtitution died with its noble founder in 1630.

The number of authors who had written on plants without any ſyſtem or method in the ſixteenth century, and the confuſion of

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names which had been introduced, ſeemed to render it at length neceſſary for the preſervation of the ſcience that ſome great ſyſtematic genius ſhould undertake to digeſt the confuſed maſs, and profiting of the hints of Geſner and Cæſalpinus, reduce into order the vaſt materials, with which botany was in a manner overwhelmed, rather than enriched. But this event, ſo much to be deſired, was not yet to take place in its full extent. An eminent ſervice was however rendered to botany by the two illuſtrious brothers John and Caſpar Bauhin, with whom I ſhall cloſe the hiſtory of the ſixteenth century, and enter on that of the ſeventeenth.

John Bauhin was in a great meaſure formed as a botaniſt under Geſner, but not having a turn for ſyſtem, he did not in that reſpect learn much from his great teacher. He devoted a life of more than 70 years to a critical inveſtigation of all that had been written before him, and made many valuable obſervations as well as many original diſcoveries. But he opened no new path in botany. His labours were conducted on the ſame plan as thoſe of his predeceſſors. The fruit of his ſtudies is nothing leſs than an Univerſal Hiſtory of Plants, which being left in MS. at his death in 1613, was not publiſhed till 1650, when it appeared in three volumes folio. Like all poſthumous works it has defects, which probably it would not have had if publiſhed by its author. It is a monument of labour and erudition, and contains ſo much information and ſo many elucidations of preceding authors, as to be ſtill in great eſtimation, notwithſtanding its want of order and the rudeneſs of the figures.—— This work paved the way for Caſpar Bauhin in the much more important and original one which he undertook and happily perfected, the publication of which forms one of the moſt remarkable æras in botany, and which was firſt printed in 1623, under the title of Pinax Theatri Botanici. This was meant, as its name imports, as an index to all the botanical knowledge then in the world,

and its author exultingly ſtyles it the labour of 40 years. In this work about 6000 plants are arranged in twelve books, with ſome ſlight traces of ſyſtem, and each plant is diſtinguiſhed by a kind of deſcriptive name, under which are placed the names given it by every preceding author. Ray has very juſtly remarked, that beſides errors and repetitions incident to the moſt wary in ſo vaſt an undertaking, Bauhin's Pinax contains ſome hundreds of plants there mentioned as ſpecies, which have ſince been found to be only varieties; and if this was true in the time of Ray, it is much more ſo at preſent. Notwithſtanding ſuch imperfections, this work has been found ſo uſeful, and indeed ſo neceſſary, that it continued the general dictionary of botaniſts, till ſuperſeded by the publications of Tournefort and Linnæus, and is even now the only reſource of thoſe who wiſh to ſtudy the authors whoſe works are prior to it. But this is not all which the active mind of Caſper Bauhin undertook. He publiſhed an excellent edition of Matthiolus with many additions; and has illuſtrated about 600 new or heretofore miſtaken plants in his Prodromus, publiſhed firſt in 1620, and afterwards with an improved edition of his Pinax, in 1671, which is that moſt in uſe. He likewiſe meditated a complete hiſtory of all the plants mentioned in his Pinax, and finiſhed, as it is ſaid, three books, of which the firſt only was publiſhed by his ſon in 1658, with figures. It contains graſſes and ſome liliaceous plants. Beſides all theſe botanical labours, Caſpar Bauhin practiſed medicine with great ſucceſs, and was ſo eminently ſkilled in anatomy as to have been ſtyled in his time the prince of anatomiſts. He died in 1624, aged 64, being about 20 years younger than his brother. I have ſeen a great part of his herbarium at Baſil, in the hands of Mr. De la Chenal, profeſſor of botany there. This herbarium is ineſtimable on account of the difficulty of determining many of Bauhin's plants by his deſcriptions alone, and its worthy poſſeſſor devotes it to the purpoſes

poſes of public utility, to which indeed all treaſures of ſcience ought to be devoted.

We muſt now make a pauſe in the hiſtory of botany. Notwithſtanding the labours of the Bauhins ſeemed to promiſe new vigour to this lovely ſcience, it languiſhed for nearly half a century after the time in which they lived. Not that there were no botanical writers, nor any collectors of plants in all that period, for there were a conſiderable number of both, as well as ſeveral writers on the materia medica. Hernandez was ſent to South America by Philip II. at a vaſt expence, but the fruit of his labours is one of the worſt books in botany. The Italians puzzled themſelves and their readers about opobalſamum and the ingredients of the mithridate; and a number of inferior writers appeared in different parts of Europe, eſpecially in Germany, whoſe names and merits I might be excuſed mentioning, even if on this occaſion I had much more time allowed me.

I muſt only except Jungius, who in his Doxoſcopiæ Phyſicæ Minores has given great proofs of botanical ſagacity, and has thrown out ſome hints, of which following botaniſts, and among them Linnæus himſelf, has profited with great advantage. Jungius died in 1657.

Our countryman Parkinſon was alſo an author of great originality and obſervation, much ſuperior in this reſpect to Gerard, or his commentator Johnſon, although his figures are inferior to theirs.

I ſhall profit of this interval to review the progreſs of zoology from the middle of the ſixteenth to the end of the ſeventeenth century.

It is remarkable that a part of natural hiſtory, ſo evidently the moſt important and the moſt intereſting to man, who is himſelf at the head of the animal creation, ſhould have lain ſo long uncultivated. From the time of Ariſtotle to Geſner and Aldrovandus, little or no improvements were made in the knowledge of animals, nor with reſpect to claſſification was any alteration attempted till the time of Ray. The Ariſtotelian diviſion of animals into vivi-

parous

parous and oviparous is well known. In the former claſs were arranged all quadrupeds, and in the latter birds, fiſhes and inſects. Ariſtotle was himſelf ſenſible that this ſyſtem muſt be taken with ſome latitude, there being ſeveral quadrupeds, as lizards, which are not viviparous, and ſome inſects and fiſhes viviparous, although not quadrupeds. By inſects he and all other naturaliſts down to Linnæus underſtood ſuch of the ſmaller kinds of animals as have the body divided into ſegments, ſo that many worms and even fiſhes were included in this diviſion.

Geſner arranged his voluminous hiſtory of animals upon the principles of Ariſtotle, ſeparating the oviparous from the viviparous quadrupeds; and Aldrovandus collected all that others had written, indeed without ſufficient diſcrimination of truth from fiction, and diſpoſed it much in the ſame order. With reſpect to Ornithology, Geſner cultivated that ſcience with peculiar ſucceſs, and is the author of many very valuable obſervations. Aldrovandus copied him in many things, and Johnſton is hardly worth mentioning, as he has done little elſe than copy both. Beſides what the authors above mentioned have given us relating to fiſhes, that branch of natural hiſtory was ably handled by Paul Jovius, an Italian phyſician of great taſte and learning in the beginning of the ſixteenth century; afterwards by the accurate Bellonius, who wrote alſo on birds; by Salvianus in his ſuperb book on aquatic animals, printed at Rome in 1554; and by Rondeletius, profeſſor at Montpelier, who publiſhed the ſame year. Inſects were alſo particularly treated of in a work the joint labour of ſeveral able men, among whom was the indefatigable Geſner; this book was publiſhed by Dr. Mouffet, an Engliſh phyſician, in 1634.

This was the ſtate of Zoology when our own immortal Harvey firſt dared to controvert one of the doctrines of Ariſtotle, which, although really unworthy of ſo great a philoſopher, nobody had hitherto

hitherto oppoſed, I mean that of equivocal generation. The metaphyſical quibbles which had ſo long diſgraced the ſchools, began now to give way to a ſpirit of enquiry and obſervation; but not in the ſchools themſelves, for from thence light ſeldom ſprings. The propoſition of Harvey, "*omnia ex ovo*," was not received without oppoſition; but this was forgotten in the much more furious oppoſition given to his other more important and intereſting doctrine, of the circulation of the blood. No ſooner was this publiſhed than a crowd of adverſaries beſet him. After in vain endeavouring to refute his opinion, they had recourſe to the common ſubterfuge of denying its originality; taking upon themſelves the greater reproach, of having been blind to the evidences already exiſting of ſo indiſputable a truth, rather than allow their illuſtrious cotemporary any merit in the diſcovery.

With Harvey begins what may be called the phyſiological period of Natural Hiſtory. His hypotheſis of generation was confirmed by the experiments of Redi and Malpighi, two very philoſophical naturaliſts, who have diſencumbered ſcience from many prejudices, and thrown much light on ſome of the moſt abſtruſe parts of phyſiology. The experiments of Redi to diſprove equivocal generation, are truly admirable, and Malpighi's inveſtigations, relating to the anatomy and transformation of ſilkworms, and the developement of the chick in the egg, are too celebrated to need any freſh eulogium. About the middle of the ſeventeenth century a new and very intereſting propoſition in phyſiology was ſtarted, that of the ſexes of plants, the honour of which is given to our countryman Sir Thomas Millington. It is to be wiſhed however that he had written ſomething himſelf upon the ſubject, or that we knew whether the idea were really originally his own. Nearly about the ſame time the diſcovery of the lymphatic veſſels in animals was made, either by Rudbeck or Thomas Bartholin, or rather by both

at once. All which I think juſtifies me in calling the period of which I am ſpeaking, a phyſiological age. In it was laid the foundation of almoſt every doctrine which has ſince been cultivated and enlarged upon, and on which all following medical and phyſiological ſyſtems have been built.

It is no wonder that ſyſtematic Zoology ſhould derive advantage from all theſe diſcoveries. Towards the end of the laſt century appeared two great naturaliſts, amply qualified to profit by them, and to whom the ſcience is infinitely indebted, our countrymen Willoughby and Ray. Theſe illuſtrious friends laboured together with uncommon ardour in the ſtudy of nature, and left ſcarcely any of her tribes unexplored. But death, which ſo often diſappoints the faireſt hopes, cut off the former in the prime of life, before he had digeſted the materials to the acquiſition of which he had devoted his youth; and they might all have been loſt to the world and his name have periſhed with them, but for the faithful friendſhip and truly ſcientific ardour of Ray. So cloſe was the intercourſe between theſe two naturaliſts, that it is not eaſy to aſſign each his due ſhare of merit. Indeed Ray has been ſo partial to the fame of his departed friend, and has cheriſhed his memory with ſuch affectionate care, that we are in danger of attributing too much to Mr. Willoughby, and too little to himſelf. Certainly however it is by no means a fair ſtatement of the caſe to ſay with Dr. Derham, that Mr. Willoughby had taken the animal kingdom for his taſk, as Mr. Ray had the vegetable one. The Ornithology and Ichthyology ſufficiently ſhew that Ray was not a mere editor of thoſe noble works, and the Synopſes Avium & Piſcium, publiſhed ſome time after, in which he has made many improvements, and ſome important changes as to arrangement, prove with how much attention he had ſtudied thoſe two branches of Zoology. I need not add that the Synopſis of Quadrupeds is, as to method, entirely

his own, although Willoughby is there often quoted for many excellent obſervations; and the ſame may be ſaid of the Hiſtoria Inſectorum, publiſhed in 1710, after the death of Ray. All theſe works are excellent in their kind, admirably methodized, and exhibit ſuch proofs of accurate obſervation, ſuch a candid love of truth, and ſuch penetration in diſcovering it, as muſt ever rank their authors among the firſt and moſt philoſophical naturaliſts.

Ray, being diſſatisfied with Ariſtotle's claſſification of animals, was the inventor of a new one, founded on the ſtructure of the heart. The Harveian experiments and doctrine of the circulation had called the peculiar attention of philoſophers to every organ which has a ſhare in that phænomenon, and to this cauſe probably we owe the method of Ray. Taking therefore the diviſion of animals into Sanguinea and Exanguia, which was a very ancient one, he ſubdivides the firſt claſs into ſuch as are furniſhed with lungs and ſuch as breathe by gills; and the former of theſe he again ſeparates into thoſe which have an heart with two ventricles, and thoſe whoſe heart has only a ſingle ventricle. The latter diviſion contains Reptiles, the former viviparous Quadrupeds, Whales and Birds. The Animalia branchiis reſpirantia include all Fiſhes properly ſo called, the Whale kind and all the Exanguia being of courſe excluded. The Animalia Exanguia are divided into greater and leſſer. The latter diviſion contains Inſects; the former is again ſubdivided into three genera, the firſt of which includes the Mollia, or Molluſca, as Cuttle-fiſh and Polypi; the ſecond Cruſtacea, as Crabs and Lobſters, which are properly Inſects; and the third Teſtacea, or ſhell-fiſh. This ſyſtem, although liable to a great many objections, which I ſhall not now ſtay to enumerate, is deſerving in many reſpects of great praiſe: its author has ſhewn great ſkill in the characters by which he has choſen to diſcriminate the ſubordinate diviſions, and in ſhort the Linnæan ſyſtem of Quadrupeds is

little more than a reformation of that of Ray. I ſhall ſoon ſpeak of the botanical merit of this great man; but before we take leave of this period of Zoology, it may be expected I ſhould ſay ſomething of Leeuwenhoek, and his theory of generation, which has made ſo much noiſe; nor may it be uſeleſs to mention him, if only as a *memento* to future theoriſts. What a pity it is, that ſo excellent an obſerver, to whom the world is indebted for ſo much ſolid phyſiological information, ſhould have produced an hypotheſis, whoſe celebrity ſeems but to have haſtened its refutation, and conſigned it to more abſolute neglect! The ſpermatic worms of Leeuwenhoek may perhaps be the jeſt of philoſophers many ages to come, while others ſhall profit of his genuine diſcoveries, without knowing to whom they are obliged.

Let us now take a general view of the ſtate of Natural Hiſtory at the end of the laſt century.

In England the flattering aſpect which this ſcience had worn under the auſpices of Charles I. was blaſted by the turbulent times which followed; but in the peaceful days of Charles II. natural hiſtory, as well as all the different branches of philoſophy, received a degree of cultivation and advancement hitherto unknown in this country; and this led on to the golden age of ſcience in England, which was crowned by the poſſeſſion of a Newton.

The Royal Society, which, from a ſmall beginning at Oxford about the year 1645, made rapid advances when removed to the metropolis, was eſtabliſhed under the protection of the king in 1662, very ſoon after his reſtoration. This learned body beſtowed great attention from the beginning, as they have ever ſince done, upon the phyſiological part of natural hiſtory. The names of Boyle, Evelyn, Hook and Needham, are among the firſt members of this ſociety; and how much they have laboured in the advancement of natural ſcience is well known. Mr. Willoughby was one of the

original

original fellows of the Royal Society, although his friend Ray was not admitted till the year 1667. Dr. Liſter, the great conchologiſt, was very early aſſociated with it, as well as that admirable vegetable phyſiologiſt Dr. Grew.

Nor was France behind-hand with England in attention to the ſciences, and among the reſt natural hiſtory. Henry IV. that great name which ſcience delights in joining with humanity to bleſs, had endeavoured long ago to promote literature and uſeful knowledge throughout his dominions. Among other inſtitutions the botanic gardens of Paris and Montpellier are owing to his munificence. But his untimely death, and the ſubſequent diſturbances, for a while put a ſtop to all farther cultivation of the arts of peace. About twenty years afterwards, by the indefatigable perſeverance of De la Broſſe, ſuperintendant of the Paris garden, the Cardinal de Richlieu was induced to grant it his protection; but this garden firſt roſe to any conſiderable degree of eminence towards the end of the laſt century under Louis XIV. This munificent prince encouraged learning with that ſplendid liberality which diſtinguiſhed all his actions. For the purpoſe of promoting botany, and enriching the royal garden, the illuſtrious Tournefort was ſent to the Levant, and the accurate and indefatigable Plumier made three voyages to America, and died as he was about undertaking a fourth. An Academy of Sciences was inſtituted at Paris in 1666, and another ſome years after at Montpellier, very ſimilar to the Royal Society of London, with which the greateſt men in Europe have always been proud to be aſſociated.

Many ſimilar inſtitutions were ſet on foot throughout Europe, as the Imperial Academy Naturæ Curioſorum, begun in 1652. A number of botanic gardens were alſo eſtabliſhed in Germany; but Linnæus has truly obſerved that they have never been rich in exotic plants, on account of the ſmall intercourſe of that country with

with the Indies; whereas the gardens of Holland were at this time overflowing with riches from the moſt diſtant parts of the globe.

The Amſterdam garden under the care of the Commelins was now one of the firſt in Europe, and that of Leyden was rendered celebrated by the catalogue publiſhed by Herman. Holland had moreover the glory of producing at this time that moſt ſumptuous and excellent work, the Hortus Malabaricus; by which a new world was in a manner laid open to the botaniſts of Europe, and from which they learned with ſurpriſe, that the knowledge of plants had made almoſt as much progreſs in the remote regions of Aſia, as in their own part of the world.

But the ſtudy of nature was no where making ſuch an uniformly ſteady progreſs as in Sweden. At Upſal, under the auſpices of the great Rudbeck, was laid the foundation of what Mr. Stillingfleet has juſtly called an unrivalled ſchool of natural hiſtory, and which was deſtined afterwards to give laws to the reſt of the world. Rarely has ſuch a variety of profound and extenſive learning been united as in Rudbeck. I have already mentioned his anatomical merit in diſcovering the lymphatics. In antiquities, eſpecially thoſe of the northern nations, and in the learned languages, his knowledge was unbounded. In botany he had erected to himſelf what might reaſonably have been thought a "monumentum ære perennius," in one of the greateſt undertakings of the kind, a collection of fine wooden cuts of all the plants then known. They were to have been arranged and named according to Bauhin's Pinax, in 12 large volumes folio. But two volumes were ſcarcely printed, when in 1702 a dreadful fire reduced almoſt all Upſal to aſhes, and with it the work of Rudbeck, and many thouſand wooden blocks already cut, beſides almoſt all the materials of an hiſtory of Lapland compoſed by his ſon, who indeed had a principal hand in the great work of which I am ſpeaking. It can ſcarcely be thought an impeachment

peachment of the venerable old man's philoſophy, that ſo cruel a diſappointment ſoon brought him with ſorrow to the grave.

All that remains of this work are a few copies of the ſecond volume, and three only of the firſt, one of which is in the Sherardian library at Oxford. Linnæus was poſſeſſed of about 120 of the wooden blocks of this firſt volume, as well as 8 or 10 unpubliſhed blocks belonging to ſome intended one; all which came with his collection into my hands: they are for the moſt part admirable figures of graſſes *.

Having been now inſenſibly led back to Botany, I ſhall take a comprehenſive view of the ſyſtematic æra of that ſcience, when ſo many new methods of claſſification were invented, moſt of which were ſtrenuouſly ſupported by their reſpective authors, who little thought that in the ſpace of half a century, oblivion would nearly level all diſtinctions between them.

The firſt who revived the idea of a claſſical arrangement of plants, ſince the time of Cæſalpinus, was Moriſon, who has been juſtly cenſured for neglecting to acknowledge how much he owed to his ingenious predeceſſor, and who has in his turn received ſimilar treatment from his followers. His method was founded chiefly on the fruit, to which, as well as the external habits of plants, he paid too much regard, and too little to the other parts of fructification. The only work claſſed according to the method of Moriſon is his own Hiſtoria Univerſalis Plantarum, an uſeful compilation, which is daily uſed as a book of reference, by thoſe who never think of his ſyſtem.

But the three principal ſyſtematic authors were Ray, Tournefort and Rivinus, between whom was much warm controverſy on the ſubject; and it muſt have been an intereſting matter indeed that

* Publiſhed under the title of Reliquiæ Rudbeckianæ, folio, 1789.

could

could ſo agitate the candid peaceable ſpirits of Ray and Tournefort. Of Ray it may be ſaid that his method was the moſt abſtruſe and ſcientific, while that of Rivinus was at firſt ſight more ſimple, but liable to as great difficulties in the execution. The former was principally founded on the fruit, the latter on the corolla, and in both were the other parts of fructification too much neglected. The ſyſtem of Tournefort, which was likewiſe formed chiefly upon the corolla, was undoubtedly far ſuperior to all the reſt then extant; yet I doubt whether that alone would have procured its author his extenſive reputation, had he not inveſtigated and diſcriminated the *genera* of plants in ſo maſterly a manner, that this alone is ſufficient to rank him above all preceding botaniſts. It is true he did not invent a mode of ſyſtematically defining theſe genera by words; this was reſerved for Linnæus: but it has been well obſerved by Monſieur Delamarck, that Tournefort was no leſs ſenſible of the diſtinctions of his genera, and he has cauſed them to be figured in ſo able a manner that they cannot be miſtaken.

This great botaniſt, chiefly unfortunate in having had ſome injudicious advocates, is the glory of the French nation. His countrymen are with reaſon proud of him, and his merits as a botaniſt and a traveller are ſo well known, that no commendation of mine can add to his fame. Yet I muſt not omit to do juſtice to his ſucceſſor Vaillant, whoſe merit I think is hardly ſufficiently known. In profiting of the indulgence granted me when at Paris of conſulting the Herbariums of theſe two eminent botaniſts, I was aſtoniſhed at the inſtances of profound knowledge and acuteneſs of judgment which I met with in that of Vaillant, both with reſpect to the genera, ſpecies, and ſynonyma of plants; whereas it is well known that Tournefort was leſs ſolicitous about the ſcientific diſtinctions of ſpecies. Vaillant is alſo one of the firſt who was well acquainted with the ſexes of plants. His academical oration on that ſubject is full of good obſervations, though not without ſome errors. In this

this work he laughs without reſerve at Leeuwenhoek's peculiar theory of generation, and ſpeaks rather too diſreſpectfully of Tournefort; for this he has never been forgiven.

There were at this time ſeveral botanical ſyſtems invented beſides thoſe above mentioned; but few being remarkable for originality or uſe, I cannot dwell long upon them. Herman's was one of the beſt. It was entirely founded on the fruit, and not very different from thoſe of Ray and Moriſon. Boerhaave's had great merit, in being founded more or leſs on all the parts of fructification. The method of Chriſtopher Knaut is an alteration of that of Ray, without any improvement. The paradoxical Chriſtian Knaut, who thought the eſſence of a flower conſiſted in its corolla, was never very famous, and would now probably make no proſelytes at all.

A ſingular ſyſtem was invented by Profeſſor Magnol of Montpellier, founded on the calyx, to which Linnæus was very partial, and he even formed a ſimilar method of claſſification himſelf: happily, however, this was not the only one he ever invented.

Nor was this æra of botany merely a ſyſtematic one. Linnæus has not ſcrupled to aſſert, that within the ſpace of 20 years, at the end of the laſt century, twice as many plants were diſcovered as had been made known by the joint labours of all preceding botaniſts. Beſides thoſe which were collected by Tournefort, Plumier and Ray, a noble collection was brought from Jamaica by Dr. Sloane, afterwards Sir Hans, of which the hiſtory in two volumes folio is well known. Mr. Sherard conſul at Smyrna, who cultivated botany with princely munificence and with the ardour and diſcernment of a true philoſopher, has been the means of making known a very great number of plants. His vaſt herbarium and library are now among the literary treaſures of Oxford. The indefatigable Plukenet procured and publiſhed an immenſe number from all parts of the

world, many of them very rare. His book is in every body's hands, and it would be ſuperfluous here to ſay any thing of its utility. Petiver was no leſs perſevering in making collections, not only of plants, but of all kinds of natural objects. His works are of a very peculiar character, and exhibit more zeal than genius or accuracy. His rough criticiſms of his contemporary Plukenet have hurt nobody but their author. The acquiſitions of Dr. Herman in Ceylon were very conſiderable. They lay a while dormant, only to appear with greater celebrity from the pen of Linnæus. In ſo brilliant a period of the hiſtory of this ſcience I am obliged to paſs over many leſs illuſtrious, although great names; and ſhall only mention Rumphius, whoſe ardour was not to be damped even by the greateſt misfortune which can befal a naturaliſt, the loſs of ſight. The rich treaſures of Amboina were made known to us by this laborious man. His book on ſhells is in high eſtimation; and his Herbarium Amboinenſe might vie with the Hortus Malabaricus, if all concerned in the publication of it had performed their parts as well as he has done his: but the figures are by no means comparable to thoſe of that ſtupendous work. The courage of Rumphius in purſuing natural hiſtory after he had loſt his ſight, reminds me of a ſimilar inſtance, I believe very little known, of a Provençal phyſician named Reboul, who undertook a manuſcript hiſtory of plants in ſeveral large folio volumes, and, becoming blind, actually completed many of the unfiniſhed chapters with his own hand after that accident. This curious manuſcript was ſhewn me in the publick library at Parma.

While Botany was making this great progreſs, Entomology began to be cultivated with an aſſiduity, which was amply repaid by the curious and aſtoniſhing facts it brought to light. The notion of equivocal generation having been refuted by Harvey, Redi and Malpighi, the propagation and metamorphoſes of inſects became an

intereſting object of enquiry with ſeveral able men, among the firſt of whom were Goedart and Swammerdam. The diſcoveries of Goedart were received with laudable caution by his contemporaries, eſpecially what relates to the hiſtory of Ichneumones; but following obſervers have confirmed the accuracy of his relations. The works of Swammerdam are full of curious information, and will ſufficiently reward thoſe whoſe patience is not to be exhauſted by his tedious heavy ſtyle. Nor muſt I forget Madam Merian, whoſe excellent work on the Surinam Inſects, one of the moſt ſplendid in natural hiſtory, is a monument of female perſeverance and enthuſiaſm.

Other admirers of nature have turned their attention to ſhells and marine productions; and the facility with which theſe bodies are preſerved in cabinets, has made the collecting them very general. A few authors had written on ſhells about the beginning of the laſt century, as Aldrovandus, Columna, Imperati, &c. but about the end of the century two very eminent writers were particularly diſtinguiſhed in Conchology, Bonanni and Liſter. Their works are in daily uſe. In the different publications of the latter are many curious anatomical obſervations, and Bonanni has treated the formation of ſhells in a very philoſophical manner. Some intereſting hints on the ſame ſubject are to be found in Steno's "De Solido intra Solidum Diſſertationis Prodromus," printed at Florence in 1669.

Of all the parts of Natural Hiſtory, Mineralogy for a long time made the ſloweſt progreſs. From the time of Theophraſtus to the end of the ſeventeenth century few improvements were made in the knowledge of Foſſils. What little was written in all that time contained only repetitions of old erroneous ſuperſtitious opinions. Even at the period of which I am ſpeaking, a ſtriking idea of the darkneſs of this ſcience may be formed, from

Tournefort's having maintained the vegetation of ſtones, and Liſter's having poſitively aſſerted that all extraneous foſſils, as petrified ſhells, &c. are only luſus naturæ, and never were the real ſhells they repreſent. Afterwards Mineralogy was cultivated with a little more care, but ſtill on wrong principles, the external figure of foſſils being principally attended to, and not their component parts; nor was it till very lately that the ſcience was eſtabliſhed on its true foundation, that of chemical analyſis.

For about fifteen years after the beginning of the preſent century nothing very conſiderable was printed in botany. But the year 1718 is remarkable for the publication of Ruppius's excellent Flora Jenenſis, and the following for the appearance of Scheuchzer's inimitable Agroſtographia and Dillenius's Flora Giſſenſis. Ruppius being cut off early in life, diſappointed the hopes which were formed of him. Dillenius is one of the moſt illuſtrious names in botany; not ſo much indeed for ſyſtematic or phyſiological merit, as for accuracy of obſervation and judicious criticiſm. About this time alſo flouriſhed Pontedera at Padua, who although a great Tournefortian, and ſtrangely prejudiced againſt the ſexes of plants, was a ſcientific botaniſt, and is very liberally praiſed by Linnæus, againſt whom he is ſaid nevertheleſs to have written ſomething, which was never publiſhed.

The removal of Dillenius to England, who publiſhed here his excellent edition of Ray's Synopſis Stirpium Britannicarum in 1724; the aſſiſtance and encouragement given to the ſcience by thoſe two diſtinguiſhed brothers William and James Sherard, as well as by Sir Hans Sloane, ſeemed to promiſe the eſtabliſhment of the botanic ſceptre in this country; eſpecially as the inſufficiency of Tournefort's ſyſtem became every day more obvious, and Boerhaave was too much occupied by medicine, to devote any conſiderable ſhare of his powers to any other purſuit. The phyſick garden at Chel-

ſea was in a very flouriſhing ſtate under the care of the celebrated Miller, and that of Mr. Sherard at Eltham contained one of the choiceſt collections in Europe. But botaniſts were almoſt at a ſtand about arrangement. All the different ſyſtems which had been propoſed, however ſpecious in univerſity lectures, having been found very inſufficient for the purpoſes of practical botany, the ſcience was again in danger of relapſing into anarchy and confuſion, and botaniſts were almoſt overwhelmed with the riches which daily flowed in upon them.

In this ſtate of things a new turn was given to the ſcience of botany, and indeed to all natural hiſtory, by the publication of the Syſtema Naturæ and Fundamenta Botanica of Linnæus in 1735. Nor were the learned world determined how they ſhould receive theſe extraordinary productions, when in 1737 the ſame author, without any other ſupport than his own tranſcendent merit, fixed the attention of all Europe, by his Critica Botanica, Genera Plantarum, Hortus Cliffortianus, Flora Lapponica and Methodus Sexualis; five works, the produce of one year, each of which would alone have been ſufficient to have immortalized its author, and in the compoſition of which a man's whole life might have been thought uſefully employed!

Having by a number of original obſervations, added to thoſe of former writers, demonſtrated the ſexes of plants, and conſequently the importance of their ſtamina and piſtilla; Linnæus founded his ſexual ſyſtem on the differences in number, ſituation and proportion of theſe organs: a ſyſtem which, although profeſſedly merely *artificial*, is really in many reſpects more agreeable to nature than many which had preceded it, and which, for facility and univerſality, has a decided ſuperiority over all hitherto invented. But this was only a part of the praiſe of this riſing genius. Having new modelled and ſyſtematically defined all the known genera of plants, he endeavoured

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in like manner to define the ſpecies upon philoſophical principles; a thing hitherto unknown, or at leaſt but faintly attempted by ſome old botaniſts. Of the ſucceſs of Linnæus in this undertaking, as well as his judgment and accuracy in collecting ſynonyms, the Hortus Cliffortianus and Flora Lapponica afford ſufficient proofs. In them may be ſeen the dawning of thoſe talents which afterwards produced the Species Plantarum; while the didactic preciſion and critical acuteneſs of the Fundamenta and Critica, gave a foretaſte of that perfection which was hereafter to appear in the Philoſophia Botanica.

Nor were the abilities of Linnæus leſs conſpicuous in his diſtribution of the animal kingdom. Of this the firſt edition of the Syſtema Naturæ was but a ſketch, which was afterwards corrected and much enlarged. It is unneceſſary here to enter upon the particulars of his ſyſtem, which has been familiar to all naturaliſts for theſe 50 years. I ſhall only ſay, that what in my opinion are the beſt parts of it, the claſſes of birds and inſects, were altogether original. For the detection of the eſſential character of the latter in their antennæ, we are entirely obliged to Linnæus; and his ſubordinate diſtinctions were not only the firſt, but long experience has proved them the beſt, that have ever been invented.

His arrangement of foſſils, the beſt at the time it was firſt publiſhed, is now generally neglected. Although in ſome inſtances founded on chemical principles, in others the moſt obvious laws of chemiſtry were ſacrificed to external figure; and the ſcience having been of late years ſo totally reformed, it is no wonder that Linnæus's Regnum Lapideum is become obſolete.

This illuſtrious man, returning in 1739 to Sweden his native country, there fixed the throne of Natural Hiſtory. Soon after his arrival he helped to lay the foundation of the Academy of Sciences at Stockholm, of which he was the firſt preſident. His diſtinguiſhed

guiſhed merit and amiable manners procured him the favour of the rich and powerful, as well as the attention and admiration of the ſcientific; and his medical and botanical lectures at Upſal ſoon attracted a number of ſtudents from all parts of the world, and exalted that univerſity to a degree of fame hitherto unknown.

It is true, he did not eſcape the attacks of envy and jealouſy; nor can any exalted character, however inoffenſive and prudent, hope to eſcape them. But they never put him ſo much off his guard as to waſte his time in controverſy, nor would he give his adverſaries immortality, by tranſmitting their names to poſterity with his own. I ſhall on the preſent occaſion follow his example; nor drag from obſcurity works long ſince forgotten, or authors who never were noticed. I cannot but obſerve, however, that profeſſor Siegeſbeck, notwithſtanding his intemperate zeal in attacking the ſexes of plants and Linnæus's ſyſtem with all the arms he could muſter, both ſacred and profane, was by no means the moſt contemptible of all the authors on that ſide the queſtion. He has been unfortunate enough to be always held forth as the botanic Zoilus; but I think there have been ſome critics, even in our own country, who for futility, ignorance and malevolence, would have much greater claims to that title, if they were of conſequence enough to claim any title at all.

We muſt now conſider ſome of the moſt eminent naturaliſts who were contemporaries with Linnæus in the beginning of his literary career, and whoſe labours tended eſſentially to the advancement of the ſcience. It would be endleſs to enumerate all who have cultivated or written upon natural hiſtory during this golden age; we can only notice a few of the moſt diſtinguiſhed.

His moſt intimate companions at this time were Artedi and Gronovius; the former of whom has in his Ichthyology diſcovered ſuch talents

talents for natural hiſtory, that his premature death cannot be ſufficiently regretted. Gronovius has contributed in various ways to the advancement of the ſcience. His Flora Virginica and his zoological works are conſtructed upon Linnæan principles. He was always in amicable correſpondence with Linnæus; as conſtant in the offices of friendſhip as deaf to the impulſes of envy and jealouſy. It was Gronovius who had the honour of naming the Linnæa after his illuſtrious friend.

One of the greateſt and moſt extenſive geniuſes of this or any age was Haller, that great phyſiologiſt and unwearied obſerver, who, though at firſt the friend, afterwards became the rival, and the only reſpectable rival, of Linnæus, compared with whom all his other criticks ſink into nothing. What a pity it is theſe illuſtrious men were not always friends! What a pity the memory of Haller ſhould have been diſgraced by the publication of thoſe confidential letters, the reviſal of which one would have thought ſufficient to diſarm the moſt inveterate mind!

——"Tantæne animis cœleſtibus iræ?"

I muſt however reſcue the name of Haller as much as poſſible from this foul ſtain. On a careful enquiry among thoſe who alone could ſatisfy me on the ſubject, I am inclined to think his powers of body and mind were ſo enfeebled that he may be ſaid to have been not himſelf at the time theſe letters were publiſhed, and probably never reviſed them. Elſe can we ſuppoſe a character like his would ſo groſsly have violated, not only the confidence of friendſhip, but even the laws of paternal affection? for in that collection are letters of one of his ſons, then no more, which no father ought to have made publick. Perhaps the temptation of producing

producing ſuch teſtimonies of his own celebrity was, in the weakneſs of old age, too flattering to that vanity from which Haller is acknowledged not to have been free. Neither was Linnæus himſelf without his ſhare of it; and if vanity were never found but with ſuch pretenſions, who would not almoſt forget that it were a weakneſs?

I cannot attempt to enumerate all the works of Haller, much leſs to diſplay their merits. His hiſtory of the Switzerland plants is one of the moſt excellent and complete Floras the world ever ſaw, and is only deprived of the general applauſe it deſerves, by the author's unconquerable diſlike to the Linnæan claſſification and nomenclature, by which his work is rendered extremely unfit for common uſe. His Phyſiology, Bibliotheca Anatomica and Bibliotheca Botanica, are among the moſt ſtupendous monuments of human knowledge as well as of human labour. They defy imitation, and ſtrike criticiſm dumb.

Another diſtinguiſhed name alſo claims our attention, that of Reaumur. I know none more worthy to ſtand next to Haller. Beſides the various diſcoveries of this great French naturaliſt which were of immediate uſe in improving the arts and manufactures of his own country, the philoſophical world at large will ever be indebted to him for his inveſtigations of ſome of the moſt intricate parts of natural hiſtory. His experiments on digeſtion, on the fructification of marine plants and on corals, are all celebrated, although with reſpect to the latter he was miſtaken in denying their animal nature; but his immortal work is his "Memoires pour ſervir à l'Hiſtoire des Inſectes," in 6 volumes, quarto; and he has publiſhed a variety of detached pieces relating to the ſame ſubject.

The Italians poſſeſſed a ſimilar genius to Reaumur in Valliſneri, whoſe experiments relating to generation, and his candour in giving

up his firſt opinion on that ſubject, merit great commendation, as well as his inveſtigations of inteſtinal animalcula. Vallifneri was profeſſor of the practice of medicine at Padua, and died in 1730. His works, being only in Italian, are not ſo much read as they deſerve to be.

The ſame country had the honour of producing another moſt excellent obſerver in Micheli of Florence, whoſe Nova Genera Plantarum, publiſhed in 1729, is a fundamental book in botany; it has the rare merit of being a work of original and accurate obſervation in the moſt difficult of all plants, graſſes, moſſes and fungi. If Dillenius and Linnæus had paid due regard to his obſervations, they would not have ſo totally miſunderſtood the fructification of moſſes as to take the capſule for the anthera. The world may ſtill hope for more information from this excellent man, on the publication of his manuſcripts, now in the hands of Mr. Targioni Tozzetti, the worthy poſſeſſor of all his remains.

This leads me to mention the Hiſtoria Muſcorum, publiſhed by Dillenius in 1741, that matchleſs work which, for the accurate delineation and determination of ſpecies, has never been rivalled in any department of botany, much leſs in that which it illuſtrates. This author has made the intricate tribe of moſſes and algæ comparatively eaſy; without ſuch a writer they would all probably have continued the opprobrium of botany, as fungi and confervæ are ſtill.

A work worthy to be compared with this of Dillenius, for the more than Herculean labour which was employed in its compoſition, is the Hierobotanicon of Olaus Celſius, profeſſor of divinity at Upſal, and one of the firſt and warmeſt patrons of Linnæus. He travelled to the Eaſt on purpoſe to enquire into the plants of ſcripture, the determination of which was his darling object for more than 50 years. His book was not eſteemed as it deſerved till its

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author was no more. There having been but 200 copies printed, it is now very rare, and is one of thoſe works which are oftener talked of than read.

I ſhall only at preſent mention the names of two more writers, who chiefly diſtinguiſhed themſelves in vegetable phyſiology, Du Hamel and Hales. One of them was the ornament of France, and the other of our own country, about the period of which I have been ſpeaking, and both have rendered great ſervices to philoſophical botany.

In the mean while Linnæus was daily advancing in ſcience and reputation. His Fauna Suecica appeared in 1746, and his Materia Medica in 1749; the former is a model of deſcriptive zoology, as the latter of methodical arrangement and conciſeneſs. They were both afterwards very much improved and enlarged, but the Materia Medica was never republiſhed by Linnæus; all the new editions of it are by Profeſſor Schreber, and the alterations are his own.

In 1751 appeared the Philoſophia Botanica, and two years afterwards the firſt edition of the Species Plantarum; two works which it were equally vain and ſuperfluous to attempt to praiſe as they deſerve. I ſhall only remark that the introduction of *trivial names*, which firſt took place in the Species Plantarum, was one of the moſt happy inventions of Linnæus, and I am perſuaded it has contributed more than any thing elſe to make his works of general uſe. Even thoſe botaniſts who from envy would never openly adopt them, have given the moſt convincing proofs of the importance of which they thought them, in labouring to deprive Linnæus of the honour of their invention; and I could mention inſtances of people, who have written againſt theſe trivial names, being obliged to recur to them daily in ſpeaking and writing of plants.

The fame of Linnæus was now ſo widely diffuſed that, as his

excellent biographer Dr. Pulteney has obſerved, he began ſcarcely to feel the diſadvantages of his northern ſituation. He had diſciples in every part of the world who vied with each other in ſending him all the objects of natural hiſtory they could procure, ſo that his cabinet and his garden were equally enriched. At the ſame time moſt of the learned ſocieties in Europe were proud to enrol him among their members, and even kings contended for the poſſeſſion of him. He was amply indemnified for declining the generous offers of the Spaniſh monarch, by the honours and advantages heaped upon him by his own ſovereign. He received the rank of nobility, which in Sweden is neither a trifling nor a barren honour, and was made a knight of the Polar Star. This was the firſt inſtance of that order having been conferred upon literary merit; certainly it could never have been beſtowed with greater propriety on any one than on Linnæus, who was himſelf that bright polar ſtar to which the ſcientific world looked up for aſſiſtance and direction.

This then may be reckoned the moſt flouriſhing period of Natural Hiſtory, when diſputes about methods and ſyſtems being for the moſt part laid aſide, every admirer of Nature's works was employed in practical obſervations and diſcoveries; while Linnæus, whom nothing eſcaped, and to whoſe deciſion all doubts and difficulties were referred, ſuperviſed and methodized the whole. His improvements had ſo much facilitated the ſtudy of botany, that it was no longer an abſtruſe ſcience confined to the ſchools, but became an agreeable amuſement to perſons of leiſure in all ranks and ſituations.

About this time ſome moſt ſuperb works in natural hiſtory were given to the public which, although not very ſyſtematic, were of uſe to the ſcience; as Seba's Theſaurus Rerum Naturalium, the firſt volume of which appeared in 1734, and the ſecond in 1735, the

the two following ones not having been publiſhed till many years after; Cateſby's Natural Hiſtory of Carolina, Florida, &c. of which the firſt volume was printed in 1731 and the ſecond in 1743; Edwards's Hiſtory of Birds, begun in 1743; and ſome others of leſs note. A work of a ſuperior kind was publiſhed at Florence in 1742, entitled Gualtieri Index Teſtarum Conchyliorum, which is remarkable for the perfection of its ſpecific differences of ſhells, in which the author ſeems cloſely to have imitated the ſtyle of the botanical works of his countryman Micheli. This is one of the moſt uſeful books of reference that we have in conchology, and in my opinion is far preferable to the work of d'Argenville printed the ſame year, although perhaps leſs complete than the new and enlarged edition of that book lately publiſhed.

In England horticulture ſeems now to have made great progreſs. Few have improved that art ſo much as the celebrated Miller; and it is hardly fair to reproach him with not having perfected it. Bartram was ſent to America for the purpoſe of ſupplying our gardens with plants, and we are much indebted to him, as well as to Houſtoun, who diſcovered many rare vegetables in South America and the Weſt Indies, and whoſe remains, long neglected, are now reſcued from oblivion.

In Holland botany was ably ſupported by the labours of the two profeſſors Van Royen at Leyden, and the aſſiduous Burman profeſſor at Amſterdam. The Theſaurus Zeylanicus and Decades Plant. Africanarum of the latter are excellent books; ſome of the figures in this laſt which I find Linnæus ſuſpected to be erroneous, or even fictitious, have ſince been found faithful. Burman had alſo the honour of publiſhing a large volume of the figures of Plumier, from copies of the original drawings, which had long lain buried at Paris, as the greater part of that admirable author's works ſtill do, eclipſed by more ſplendid productions.

In Germany Profeſſor Ludwig of Leipſic was now in great reputation; and he has ſhewn himſelf an able phyſiologiſt and accurate obſerver. He profeſſed to differ in many points from Linnæus, but oppoſed him with decency; and indeed it appears, as a noble author of our own country has lately remarked, that Ludwig, as well as Haller, were only "Linnæans in diſguiſe;" they profited of the lights they had received from him to build ſyſtems to rival his own.

No where have the Linnæan improvements been more ſlowly received than in France, which is to be attributed not only to the jealouſy of that nation for the fame of her immortal Tournefort, but alſo to her poſſeſſing ſome conſummate botaniſts, of ſufficient conſequence to ſupport for a time any ſyſtem they ſhould chooſe to eſpouſe. Among theſe the family of the Juſſieus claim the firſt place, and eſpecially Bernard de Juſſieu, a name never mentioned without reſpect. Even at Paris however Linnæus had early an illuſtrious protector in the Duke d'Ayen, now Marechal de Noailles, who correſponded with him long, procured him the notice and favour of the late king, and occaſioned his majeſty to ſend him a preſent of ſeeds from his own garden at Trianon. The work of Adanſon has alſo done ſervice to the Linnæan cauſe, although certainly that was what its author leaſt intended; but this is one of thoſe books every reader of which muſt diſſent from the author's opinions. In the ſouth of France Linnæus had more admirers. Profeſſor Gouan of Montpellier has adopted his principles both in his ichthyological and botanical works; and the excellent Gerard in his Flora Galloprovincialis, although he has not followed the ſyſtem of Linnæus, is every where cloſely attached to his principles, and has ever been an enthuſiaſtic admirer of his merit. Nor muſt I forget Profeſſor Sauvages of Montpellier, who generouſly preſented Linnæus with his whole herbarium, rich in the plants of

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that delightful country; nor his friend Monſieur Le Monnier, one of the warmeſt admirers of the illuſtrious Swede. This gentleman was ſent to the ſouth of France as a botaniſt in 1740, with ſome other philoſophers who went there for aſtronomical purpoſes. Afterwards he became firſt phyſician to Louis XV. and now enjoys his "*otium cum dignitate*" in a delightful retirement near Verſailles, where he pays particular attention to the cultivation of trees and ſhrubs, and poſſeſſes one of the richeſt herbariums in France.

At Berlin botany and Linnæus had long a noble ſupport in Profeſſor Gleditſch, who firſt principally diſtinguiſhed himſelf by anſwering Siegeſbeck's criticiſm of the Linnæan ſyſtem; and his victory was decided indeed when Siegeſbeck publiſhed his *Vaniloquentiæ Gleditſchianæ Specimen*, in the firſt paragraph of which that writer gives him what may almoſt be called "the lie direct." But Gleditſch was better employed than in returning it. He applied himſelf to the inveſtigation of the obſcure phyſiology of Fungi and other orders of the Cryptogamia, and in 1753 publiſhed an able and elaborate work, entitled Methodus Fungorum. The Memoirs of the Berlin Society abound with excellent treatiſes of this author relating to agriculture and rural œconomy. Nor did he neglect ſyſtematic botany. By no means a ſervile follower of Linnæus, he publiſhed in 1764 a ſyſtem founded on the ſituation of the ſtamina, the principle of which is good, and muſt always be kept in view by all botaniſts; but the claſſes of Gleditſch being ſolely founded on this circumſtance, are neceſſarily too few: his orders are borrowed from the claſſes of Linnæus.

Botanical works were daily multiplying in various parts of Europe. In 1745 appeared Leche's Primitiæ Floræ Scanicæ, and Seguier's rich catalogue of the Plantæ Veronenſes. It has been alledged by ſome faſtidious people, that the preſent century, and eſpecially the Linnæan age, has been overburthened with ſuch kind of catalogues,

which require no abilities in their compoſition, and anſwer no purpoſe when done. A French writer, whom I am tired of naming, has declared himſelf of this opinion; and his own practice has been ſo conformable to it, that he has never favoured the world with an account of the plants of Senegal, a country which he went purpoſely to inveſtigate. Happily all good botaniſts have not imitated him, or we ſhould never have ſeen Scopoli's ineſtimable Flora Carniolica, the various Floras of Allioni, De Gorter, Gunner, Hudſon, Gouan, Leers, Pollich, Weis and many others, which have been of great uſe to local, and indeed general botany; and even if every one of the valuable works juſt mentioned had been uſeleſs, who would not have thought them ſufficiently atoned for by the Flora Lapponica and Flora Suecica of Linnæus?

I am now led to conſider the ſervices rendered to natural hiſtory by the various diſciples of this eminent man, and others, who have undertaken hazardous and laborious journeys, on purpoſe to examine the productions of countries hitherto not at all or but ſlightly inveſtigated. And what praiſe does not the ardour of ſuch active promoters of ſcience deſerve? As no one ever felt more of this ardour than Linnæus, when the humble attractions of an arctic flora incited him to undertake his painful Lapland tour; ſo I think none has been ſo ſucceſsful as this great man in exciting the ſame ſpirit in others. Before I ſpeak of his pupils, however, the order of time obliges me to mention Buxbaum and Gmelin. The former may be ſlightly paſſed over. He was ſent by the Peterſburg Academy to collect plants in the Levant. The fruits of his labours are publiſhed in five Centuriæ, with wretched plates and very indifferent deſcriptions. The ſame ſociety were much more fortunate in their choice of Gmelin to undertake the examination of Siberia. That country had before been viſited by Gerber and ſome other botaniſts, but their acquiſitions were

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trifling compared with thoſe of Gmelin, who ſpent 10 years, viz. from 1733 to 43 in Siberia. His Flora Sibirica, now increaſed to four volumes quarto, with an immenſe number of figures, and excellent deſcriptions and ſynonyms, is one of the beſt works of the kind, and contains many very rare plants. Philip Frederick, the brother of this author, has written *Otia Botanica* and ſome other things. Samuel Gottlieb Gmelin, ſon of the laſt mentioned, is celebrated for his hiſtory of the genus Fucus, printed at Peterſburg in 1768.

The expedition of Ternſtroem, one of the firſt of Linnæus's diſciples whom the ſpirit of curioſity led to viſit countries far remote from his own, was an unfortunate one. This young man undertook a voyage to China in 1745, but died at Poulicandor. We have no hiſtory of his voyage. His memory is honoured with a plant in the Supplementum Plantarum at the inſtigation of Mutis, for Linnæus himſelf had not an high opinion of his merit.

Kalm, who viſited North America in 1747, was more fortunate. His travels are ſo well known, from the account of them tranſlated into Engliſh, that I need ſay little about them. His botanical diſcoveries very materially enriched the Species Plantarum of his great maſter, and the Linnæan Herbarium abounds with ſpecimens brought home by him, diſtinguiſhed by the letter K. His own collection of dried plants is ſaid to be mouldering away in Sweden, in

> "The lumber garret of his *wiſer* heir."

Haſſelquiſt viſited Egypt and the Holy Land in 1749. No one has ſhewn greater zeal or activity than this ingenious young man, whoſe premature death cannot be too much regretted. He was alike ſkilful in zoology and botany, as the account of his travels publiſhed by Linnæus, and ſince tranſlated into Engliſh, ſufficiently ſhews. In vain has an invidious author, who has himſelf long en-

joyed an unſubſtantial reputation, endeavoured to blaſt the memory of Haſſelquiſt. His calumnies have been refuted by Dr. Sparrman, who has juſtly defended his countryman.

Oſbeck, another traveller well known in England from the tranſlation of his voyage, went to the Eaſt Indies in 1750, as chaplain to a Swediſh ſhip. He ſpent ſome time in China, of the natural hiſtory of which he has told us much, and has made known many new plants, among which is the Oſbeckia.

Loefling, a favourite diſciple of Linnæus and an excellent botaniſt, undertook the examination of Spain in 1751, where he found many new and rare plants, and probably would have made many more diſcoveries, had his ſtay been longer in that rich, and hitherto almoſt unexplored country; but he left it for one ſtill more intereſting, South America, where he would, no doubt, have made a rich harveſt, had his life and health been continued; but he was ſoon cut off at the age of 27. His letters and botanical deſcriptions have been publiſhed by his illuſtrious maſter, who, in this inſtance, as well as on every other occaſion, has given proofs of that ſenſibility which muſt ever make him as dear to humanity as to ſcience.

I forbear to enlarge upon other expeditions of leſs note, as thoſe of Montin and Solander to Lapland, Bergius and Falk to Gothland, &c. although each contributed to the general ſtock of natural knowledge very much. It is to be regretted we have not had more information from Rolander, who viſited Surinam and St. Euſtatia in 1755. He ſent home indeed ſeveral curious inſects, mentioned in the Syſtema Naturæ; but I find, by a letter of Linnæus to Gerard, that he eſteemed Rolander the firſt entomologiſt after Reaumur. A pupil of Linnæus, named Martin, viſited Spitzbergen in 1758: he muſt not be confounded with Martens, who went to the ſame country in 1671, and whoſe rude figures are quoted by Linnæus. I muſt not omit Toren, who went twice

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to the Eaſt Indies, and deſcribed his whole voyage in letters to Linnæus, enriched with many obſervations relating to natural hiſtory, all which were publiſhed with Oſbeck's voyage, and tranſlated into Engliſh by Dr. Forſter.

I am led to conſider ſome of the moſt illuſtrious naturaliſts of the preſent age, whoſe works and whoſe diſcoveries have been long ſo generally known as almoſt to preclude the neceſſity of mentioning them, were it not neceſſary to the uniformity of my plan. Of theſe Profeſſor Jacquin claims the firſt place. He was firſt known by his Hiſtoria Plantarum Americanarum, publiſhed in 1763, in folio, with many figures, and which contains deſcriptions of a vaſt number of plants of South America, ſcarcely ever ſeen by any body elſe. This book has lately been republiſhed, without any material addition, except that the plates are coloured; for its illuſtrious author has of late years applied himſelf to the improvement of botanical ichnography in the moſt eminent manner. Who has not ſeen and admired his Hortus Vindobonenſis and Flora Auſtriaca? And we have now no longer to regret the want of *differentia ſpecifica* in the works of Jacquin; for, with a degree of candor which does him the higheſt honour, he has deigned to liſten to the remonſtrance of the younger Linnæus on this ſubject, and has given the eſſential characters of all the plants figured in his Icones Plantarum rariorum.

Another celebrated work is Brown's Hiſtory of Jamaica, publiſhed in 1756, and now very rare, as the copies remaining at the bookſeller's, after the firſt ſale of the book, were burnt. Its elegant plates were drawn by Ehret, the beſt botanical draftſman of his time. The herbarium of Dr. Browne, who is ſtill living in Ireland, was bought by Dr. Solander many years ago, and ſent to Linnæus: the ſpecimens are not ſplendid, but important for the determination of many obſcure plants.

Two ſuperb publications were ſet on foot by royal munificence in Denmark, Regenfuſs's hiſtory of ſhells, and the Flora Danica. The former has, I think, the ſuperiority in point of execution over moſt works in natural hiſtory, except, perhaps, Baron Born's account of the ſhells in the Imperial Muſeum at Vienna. The Flora Danica, while under the direction of Oeder, was equally well executed; but Profeſſor Muller, more of a zoologiſt than a botaniſt, continued it with leſs care and perfection. Its reputation will, I doubt not, ſoon be abundantly reſtored by the abilities of Profeſſor Vahl, to whoſe care it is now entruſted.

We muſt now look back a little to endeavour to do juſtice to ſome great names in zoology. The age of Linnæus has been no leſs brilliant in this branch of natural hiſtory than in botany: but before I enter upon the works of his immediate diſciples or followers, I muſt ſpeak of his adverſary Klein, who objected to ſeveral of his alterations in zoology, with more reaſon on his ſide than any of the botanical opponents of Linnæus ever had; ſtill his remarks have not been much attended to. He alſo, like all the other adverſaries of our great teacher, laboured to find out contradictions in his works; as if the irregularities of Nature were to be laid to the charge of him, whoſe works and whoſe ſyſtem are often obſcure, merely from their conſonancy with Nature. Klein deſerves great praiſe for his multifarious works in zoology; he has left ſcarcely any part of the ſcience untouched, and has treated it both ſyſtematically and phyſiologically.

I haſten to a bright ornament of our own country, the ingenious, accurate and patient Ellis, whoſe diſcoveries relating to corallines form one of the moſt intereſting events in the natural hiſtory of the preſent century, and whoſe name will ever be revered while ſcientific or perſonal merit are held in eſteem. Nor is it poſſible for me, in paying this tribute to the memory of Mr. Ellis, to forget his friend

friend and very counterpart Dr. Garden, to whom Linnæus was ſo much obliged in his laſt edition of the Syſtema Naturæ that I think no name occurs there more frequently. This gentleman, long reſident in Carolina, is celebrated for his diſcovery of the Siren lacertina, that ſingular animal, for which Linnæus was obliged to form a new order in his ſyſtem. Dr. Garden is now returned to this country. Long may it be before I am at liberty to pay that unreſerved tribute to his merit which I have given to the departed Ellis!

It is well known that Mr. Ellis was one of the firſt who clearly made out the animal nature of corallines, and his opinion on the ſubject is now univerſally adopted. In the beginning, however, he had an opponent in Dr. Baſter, a Dutch naturaliſt, who maintained a contrary opinion, and argued with great ingenuity for the vegetable nature of theſe bodies, aſſerting that the polypes were merely accidental inhabitants of them, and not a part of their ſubſtance. The ſame author has publiſhed ſeveral other works on different marine inſects, worms and plants, under the title of *Opuſcula Subſeciva*, which are elaborate and curious: they are the performances of a real obſerver.

This intricate part of natural hiſtory has been inveſtigated by ſeveral other writers, as Bohadſch and Muller; but by none more ably than the celebrated Pallas, whoſe ſyſtematic work on Zoophyta is neceſſary to all who apply themſelves to this ſtudy.

No branch of natural hiſtory, after botany, has for ſome years paſt had more attention paid to it than entomology. Nor is this to be wondered at. Botany neceſſarily leads to the ſtudy of inſects; for it is impoſſible to inveſtigate plants in their native ſituations, without having our attention perpetually awakened by the infinite variety of thoſe active little beings, employed in a thouſand different ways in ſupplying themſelves with food and lodging, in

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repulſing the attacks of their enemies, or in exerciſing a more than Aſiatic deſpotiſm over myriads below them. Thus many of the moſt ſyſtematic botaniſts of the preſent age, as Scopoli, Hudſon, Allioni, have been led to the ſtudy of entomology. Another claſs of authors have undertaken to publiſh figures of inſects, as Sultzer and Friſch, ſometimes accompanied with their hiſtory at large, as in the excellent works of Roeſel and Sepp. I doubt whether the coloured plates of the latter have ever been excelled in any department of natural hiſtory. A moſt elaborate work, conſiſting only of coloured plates of inſects, was undertaken under the inſpection of Linnæus, by Clerck, the author of which dying ſoon after it was publiſhed, had time to colour a very few copies only, and theſe are much valued by the curious. In my opinion this work is more remarkable for labour than ſkill, and is far excelled by that of our countryman Mr. Drury, which I hope I may, without being accuſed of partiality, rank among the very firſt of its kind. I need ſay nothing of Albin and Wilkes, whoſe plates were admired in their time, but are now eclipſed by many. The Entomologia of Schæffer, the celebrated naturaliſt of Ratiſbon, ſo well known by his figures of Fungi, and other works, are very ably and carefully executed. I have only two more entomological writers to mention at preſent, but thoſe are very illuſtrious ones, Geoffroy and De Geer. The work of the former is an hiſtory, in French, of the inſects found about Paris, with a few excellent plates, chiefly as examples of the different genera. This with the Entomologia Carniolica of Scopoli, and the works of Linnæus, are the claſſical books indiſpenſably neceſſary to every ſyſtematic ſtudent of European inſects. Thoſe who wiſh to ſtudy their hiſtory and metamorphoſes more fully, will find ample ſatisfaction in the ineſtimable work of De Geer, which is a counterpart of that of Reaumur, and equally extenſive and accurate. Its author, a Swediſh nobleman, deſerves to

be ranked among the moſt able promoters of the ſcience which he cultivated.

I have before mentioned that the botanical ſyſtem of Linnæus was not readily received in France. Still leſs regard was paid there to his zoological works; and this is principally to be attributed to the ſucceſs of his great opponent the Count de Buffon, whoſe ſplendid publications and captivating ſtyle of writing, ſo well calculated to dazzle the multitude and to charm the people among whom he lived, engroſſed all the attention of his countrymen, and have been admired throughout Europe. Indeed thoſe who are leaſt partial to this celebrated writer muſt allow that he has contributed much to encourage and promote the ſtudy of nature, has made many valuable obſervations, and collected a variety of intereſting facts. We muſt remember however that the facts of ſo theoretical a writer are always to be received with caution: not that I would ſuſpect any philoſopher of wilful miſrepreſentations, but a prudent theoriſt will ſcarcely truſt his own eyes; and the world are pretty well agreed that the hypotheſes of Buffon are, for the moſt part, the very eſſence of futility; though ſeveral have laughed at them, few have taken the pains to refute them.

The French have long poſſeſſed a more ſyſtematic writer in Briſſon, whoſe *Regne Animal* has great merit, and whoſe excellent and elaborate hiſtory of birds, none who purſue that part of zoology can be without.

England too has produced a genius, at leaſt equal to the latter, in Mr. Pennant, who has almoſt exhauſted the three firſt claſſes of the zoology of Great Britain, and whoſe name and works are too celebrated to need my commendation here.

Before I return to Linnæus I muſt mention the illuſtrious Mr. Bonnet of Geneva, an enthuſiaſtic admirer of the works of nature, whoſe candour and ingenuity cannot but obtain our eſteem, whether

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we adopt his theories or not. This author is ſo remarkably inattentive to nomenclature and ſyſtematic arrangement, that an acrimonious enemy of Linnæus has quoted him as aſſenting to his own illiberal ſentiments of that great man; but I am ſure nothing could be more unjuſt than to make Bonnet a partiſan of ſuch animoſity. Happy are thoſe true philoſophers, who, by an attention to the works of the Creator, are led, like this amiable man, to make themſelves better as well as wiſer, and to diffuſe not only knowledge but happineſs on all around them!

Linnæus, whoſe powers were beginning to decline, publiſhed in 1771 the *Mantiſſa altera*, which may be conſidered as his botanical teſtament. It is partly a collection of remarks and corrections made at different times, and contains, beſides, deſcriptions of a number of new plants, of which the rich communications of Dr. Mutis, from the continent of South America, make a conſiderable part. This gentleman, and ſome other Spaniſh botaniſts his friends, have had the good fortune of inveſtigating the countries of Mexico and new Granada, hitherto little known to botaniſts; and the fruits of their induſtry were all ſent to Linnæus. Among them, the great variety of beautiful and very extraordinary new plants of the claſs Syngeneſia are remarkable. The fineſt of all was honoured with the name of Mutiſia, and publiſhed by the younger Linnæus in his Supplementum Plantarum, a work the foundation of which was laid by his illuſtrious father not long before his death. I forbear to enlarge upon this melancholy period of the hiſtory of our ſcience, which deprived it of its brighteſt ornament. The circumſtances of the death of Linnæus, with the honours paid to his memory, are known to all; nor need I on the preſent occaſion make any artificial diſplay of his merits, or of the loſs which ſcience ſuſtained by his death. I am convinced none of my hearers has any thing to learn on this ſubject, and I would

rather prefer the more cheerful taſk of tracing the ſucceſs of his labours, and the effect of the ſpirit he had raiſed, in the enterpriſes and diſcoveries of many eminent naturaliſts, ſeveral of them his immediate pupils, whoſe deſerved fame reflected ſuch diſtinguiſhed honour on the laſt years of their great teacher.

Here however a new difficulty preſents itſelf. In the former part of this diſcourſe, having principally had occaſion to ſpeak of authors no longer living, and known to us chiefly by their works, I have, to the beſt of my judgment, given an impartial and unreſerved account of their merits. Glaring defects have been generally pointed out, but I have more frequently indulged in the more agreeable office of praiſing merit of all kinds wherever it occurred. In ſo doing I have not been actuated by a ſenſeleſs veneration for former times, nor have I prepoſterouſly aimed by a vain and uſeleſs homage to

——"ſoothe the dull cold ear of death."

To excite laudable emulation has been my only intention. But now that I find myſelf either treading (to uſe Dr. Johnſon's words) on aſhes not yet cold, or am to ſpeak of naturaliſts with whom I am perſonally connected, and of others whoſe approbation and eſteem I cannot but be anxious to obtain, even the juſt tribute of applauſe might appear like ſervile adulation. This conſideration, added to my having already extended my diſcourſe to an immoderate length, will I hope juſtify me in touching now but ſlightly on many great names and many arduous undertakings, eſpecially as I could but repeat facts and circumſtances familiar to all, and ſhould run the riſque of exhauſting the patience of my hearers without giving them any information. I am perſuaded no one whom I have now the honour of addreſſing needs to be informed of the merits of a Thunberg, Sparrman, Pallas, Fabricius, Swartz, or Hedwig, of the vaſt phyſiological diſcoveries of a Camper or Hunter, much leſs of the liberality and extenſive knowledge of a Banks, or the genius

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and worth of the ever to be lamented Solander. Who is not acquainted with every circumſtance of that celebrated voyage round the world, which has enriched every branch of natural knowledge in ſo eminent a degree? Who has not obſerved with pleaſure the laudable emulation of a neighbouring country in promoting ſimilar undertakings, to which we are indebted for the botanical acquiſitions of Commerſon, Sonnerat, Aublet and Dombey? When I conſider all theſe, added to the diſcoveries of Pallas in Siberia, of Sparrman, Maſſon and Thunberg at the Cape, and eſpecially the acquiſitions which the latter, undiſmayed by the moſt formidable difficulties, made in Japan; when I contemplate the diſtinguiſhed abilities of many other living naturaliſts, the excellent publications of Schreber, Rottboll, Retzius, Allioni, Scopoli, Brouſſonet, L'Heritier, the philoſophical Herman, and many others, not to mention ſome in our own country which may vie with any of theſe, I am induced to conſider the preſent age as one of the moſt propitious to the ſtudy of nature, on the moſt ſolid and philoſophical principles; and when I look around me at home, and ſee how very much the love of botany in particular, and the cultivation of plants, is increaſing among perſons of rank and fortune, as well as the treaſures which are daily enriching our gardens and cabinets, I cannot help indulging the moſt flattering hopes that my own country will ſoon in an eminent manner be diſtinguiſhed above the reſt of Euope in theſe uſeful and pleaſing purſuits. But the degree of credit we have already acquired muſt not lull us into a torpid ſecurity. We muſt keep in mind that France, our rival in power, is alſo our rival in ſcience, and even at Paris Linnæus has now his followers, who deſpiſing all national prejudices, dare to admire truth and genius wherever they find them. Let this excite in us a laudable ſpirit of emulation; not the narrow jealouſy which diſtinguiſhes thoſe, who, conſcious of their own weakneſs or undeſerved reputa-

tion, dread every approach towards perfection in others. All who purſue the ſame ſtudies ſhould labour together for the common good: every degree of aſſiſtance, every deſerved commendation which they give to each other, is the moſt probable means of advancing their own fame; while every atom of uſurped honour, if it does not immediately cover its vain poſſeſſor with opprobrium, is almoſt certain to be deducted with intereſt from his character by a diſcerning and impartial poſterity.

It now only remains for me to point out what I conceive to be the peculiar objects of our preſent inſtitution. I need not enforce the propriety of each of us endeavouring to promote as much as poſſible the main ends of our undertaking, and to contribute all in our power to the general ſtock of knowledge. Theſe are indiſpenſable obligations upon all who aſſociate themſelves with any literary ſociety. Thoſe who do not comply with them incur diſgrace inſtead of honour, for a title is but a reproach to thoſe who do not deſerve it; nor can they have a ſhare in the reputation of a ſociety, who never in any manner contributed to its advancement.

Beſides an attention to natural hiſtory in general, a peculiar regard to the productions of our own country may be expected from us. We have yet much to learn concerning many plants, which authors copy from one another as the produce of Great Britain, but which few have ſeen; and our animal productions are ſtill leſs underſtood. Whatever relates to the hiſtory of theſe, their œconomy in the general plan of nature, or their uſe to man in particular, is a proper object for our enquiries. Of the productions of our own country we ought to make ourſelves perfectly maſters, as no natural object can any where be ſtudied half ſo well as in its native ſoil. This however not being always practicable, botanic gardens and cabinets of natural hiſtory have been invented, in which the productions of the moſt diſtant climes are brought at

once before us. No country that I know of can bear a compariſon with England in this reſpect. The royal garden at Kew is undoubtedly the firſt in the world, and we have a number of others, both public and private, each of which may vie with the moſt celebrated gardens of other countries. Nor have we a leſs decided ſuperiority in Cabinets. That of the Britiſh Muſeum, which contains among other things the original herbariums of Sloane, Plukenet, Petiver, Kæmpfer, Boerhaave, of many of the diſciples of Ray, and ſeveral others, beſides innumerable treaſures of zoology, claims the firſt place. That of the late Sir Aſhton Lever ſtands I believe unrivalled in birds and quadrupeds; not to mention many others. But is it not a reproach to the naturaliſts of Great Britain that ſo many rarities ſhould remain in their hands undeſcribed? that foreigners ſhould eagerly catch at one or two plants obtained from our gardens, which we for years have been trampling under foot unnoticed? Yet how, till now, could ſuch nondeſcripts have been made publick? Large works in natural hiſtory are expenſive and of hazardous ſale; few private people can undertake them; nor has there hitherto been any ſociety to which detached deſcriptions could be communicated. It is altogether incompatible with the plan of the Royal Society, engaged as it is in all the branches of philoſophy, to enter into the minutiæ of natural hiſtory; ſuch an inſtitution therefore as ours is abſolutely neceſſary, to prevent all the pains and expence of collectors, all the experience of cultivators, all the remarks of real obſervers, from being loſt to the world. The ſlighteſt piece of information which may tend to the advancement of the ſcience we ſhould thankfully receive. However trifling in itſelf, yet combined with other facts, it may become important. Whatever relates to the determination of ſpecies, even in the loweſt and ſeemingly unimportant tribes of nature's works, ought never to be neglected. Nor let the

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humble and patient ſtudent of this very difficult part of natural hiſtory be diſcouraged by the ſneers of the ſupercilious coxcomb, or of the ignorant vulgar. He who determines with certainty a ſingle ſpecies of the minuteſt moſs or meaneſt inſect, adds ſo far to the general ſtock of human knowledge, which is more than can be ſaid of many a celebrated name: no one can tell of what importance that ſimple fact may be to future ages; and when we conſider how many millions of our fellow creatures paſs through life without furniſhing a ſingle atom to augment this ſtock, we ſhall learn to think with more reſpect of thoſe who do.

But nothing will be with more reaſon expected from the members of this ſociety than a ſtrict attention to the laws and principles of Linnæus, ſo far as they have been found to be good. No where have his works been more ſtudied and applied to practice than in this country, nor can any other be ſo competent to eſtimate his merits or correct his defects. I am perſuaded nothing can be done more uſeful to the ſcience of natural hiſtory than, working on the publications of this illuſtrious man as a foundation, to endeavour to give them that perfection of which they are capable, and to incorporate with them all new diſcoveries. We who have it in our power to give real information, ſhould deſpiſe the ſilly vanity of making new ſyſtems or arrangements, merely for the ſake of being talked of. An artificial method like that of Linnæus may be changed a thouſand different ways, and each ſeem beſt to its inventor. If any one, deſpairing of getting immortality by any other means, ſhould pleaſe to name Cryptogamia the firſt claſs and Monandria the laſt, I ſhould rank him but with Chriſtopher Knaut, who made about as wiſe an attempt upon the method of Ray.

Whatever we may think of the ſyſtem of Linnæus, there are certain great principles laid down by him, the excellence of which is now ſo well known, and ſo generally admitted, that none who

pretends to the name of a naturaliſt can avoid conforming to them. The laws, for inſtance, according to which he conſtructed his *generic names* and *ſpecific differences*, which we ſhould do well to imitate, although leſs ſtrictly, in the application of *trivial names*. I hope never to ſee any deſcriptions ſent into the world by this ſociety without ſpecific differences; they are what diſtinguiſh a true ſcientific naturaliſt from an empiric, and nothing but incapacity in an author can make us pardon the want of them. Without a ſtrict attention to this maxim, the ſcience will ſoon relapſe into its original barbariſm, nor can any thing but another Linnæus reſtore it. Let not the excellent work of my friend Mr. Latham be here cited againſt me; for that ingenious author is too judicious to have neglected this material point; he is poſſeſſed of the eſſential characters of all his birds, and means to publiſh them in a ſyſtematic form as a ſupplement to his great work. I wiſh I could make the ſame apology for ſome other eminent writers. But how would their works ſhrink if reduced to Linnæan conciſeneſs and preciſion!

A kind of knowledge which naturaliſts have a right to expect from us in a ſuperior degree, is the accurate determination of the ſpecies deſcribed by Linnæus, and indeed thoſe of many other authors. Our acceſs to the ſeveral original collections I have mentioned, to the immenſe herbarium of Sir Joſeph Banks, which contains the entire collections of ſeveral celebrated botaniſts, but more eſpecially to the very herbarium and muſeum of Linnæus himſelf, muſt give us means of knowledge not to be had elſewhere. This is a ſubject on which I ſpeak with peculiar pleaſure, as in this reſpect I may hope to be infinitely more uſeful to the preſent inſtitution, than could have been expected from any abilities of my own. A train of events, which I cannot help calling moſt fortunate, having brought into my hands every thing which Linnæus

poſſeſſed

poſſeſſed relating to natural hiſtory or medicine, his entire library, manuſcripts, and the correſpondence of his whole life, as well as all the acquiſitions made by the younger Linnæus in his tour through Europe, after his father's deceaſe, but which his own premature death prevented him from communicating to the world; all theſe will be a never failing reſource to us in every difficulty, as well as a fund of information not eaſily to be exhauſted. For my own part I conſider myſelf as a truſtee of the public. I hold theſe treaſures only for the purpoſe of making them uſeful to the world and natural hiſtory in general, and particularly to this ſociety, of which I glory in having contributed to lay the foundation, and to the ſervice of which I ſhall joyfully conſecrate my labours, ſo long as it continues to anſwer the purpoſes for which it is deſigned.